

## **REMARKS/ARGUMENTS**

The Office Action mailed March 10, 2006 has been reviewed and carefully considered. Claims 1-14 and 18-23 are pending in this application, with claims 1 and 18 being the only independent claims. Reconsideration of the above-identified application, as herein amended and in view of the following remarks, is respectfully requested.

### **Objection to the Abstract**

The Examiner states that the Abstract is not in proper format because it is greater than 150 words. A new abstract of the invention is attached hereto which complies with all the formal requirements. Accordingly, the objection to the Abstract should now be withdrawn.

### **Rejection of Claims over Prior Art**

Claims 1-2, 4-14, and 18-23 stand rejected under 35 U.S.C. §103 as unpatentable over U.S. Patent No. 5,788,632 (Pezzaniti).

Claim 3 stands rejected under 35 U.S.C. §103 as unpatentable over Pezzaniti in view of U.S. Patent No. 6,697,157 (Wang).

### **Independent claim 1**

Independent claim 1 is directed to an apparatus for measuring retardance in a sample and includes the limitations “a controller for varying a selected elliptical polarization state of the second polarizer to correspond to a plural number of states  $\chi_i$  with a chosen Poincare latitude and longitude within a distance  $\epsilon$  of a chosen pole of a Poincare sphere”, and “a processor connected to the detector for determining the sample retardance from the measured incident light intensity obtained when the second polarizer is set to each of the states  $\chi_i$ ”.

Pezzaniti fails to teach or suggest the above recitations because (1) Pezzaniti teaches only measurement of optical rotation (circular retardance) and circular dichroism

(circular diattenuation) and fails to disclose, teach or suggest determining sample retardance (i.e., linear retardance); and (2) there is no motivation in Pezzaniti for using the states  $\chi_i$  with a chosen Poincare latitude and longitude within a distance  $\epsilon$  of a chosen pole of a Poincare sphere, as recited in independent claim 1.

Pezzaniti discloses an apparatus and process for the non-invasive measurement of optically active compounds (col. 4, lines 16-20, of Pezzaniti). The term “non-invasive” in Pezzaniti means that the process is carried out on the organism without invading that organism, i.e., without removing a sample (col. 4, lines 27-33). Pezzaniti uses the Mueller matrix for determining the effect the sample has upon the light (col. 5, lines 64-67). As further disclosed by Pezzaniti, many measurements (7 or 16) are required to complete the Mueller matrix because there is no way to directly measure the elements of the matrix (col. 6, lines 6-14). Pezzaniti particularly discloses a process for measuring optical rotation (circular retardance) and circular dichroism (circular diattenuation) using the Mueller matrix (col. 7, lines 21-25).

Pezzaniti fails to teach or suggest “a processor connected to the detector for determining the sample retardance from the measured incident light intensity obtained when the second polarizer is set to each of the states  $\chi_i$ ” because the term “retardance”, as used throughout the present specification, refers to the linear retardance. This is made clear <sup>to those skilled in the art</sup> in the specification because each specific embodiment described on pages 15-20 of the present application includes a measurement of an azimuth angle (i.e., orientation), a parameter which does not apply to circular retardance. In contrast, Pezzaniti specifically discloses measuring optical rotation (circular retardance) and circular dichroism (circular diattenuation). Moreover, Pezzaniti discloses that for a solution with a collection of molecules in random orientations, the linear retardance and linear diattenuation contributions of the individual molecules will average to zero (col. 6, lines

42-55). Since Pezzaniti discloses non-invasive measurement of molecules in an organism, the molecules will typically be a collection of molecules in random orientations in the organism. Thus, Pezzaniti fails to disclose, teach, or suggest "a processor connected to the detector for determining the sample retardance from the measured incident light intensity obtained when the second polarizer is set to each of the states  $\chi_i$ ", as recited in independent claim 1.

Regarding the second reason, the Examiner states that the limitation "a controller for varying a selected elliptical polarization state of the second polarizer to correspond to a plural number of states  $\chi_i$  with a chosen Poincare latitude and longitude within a distance  $\epsilon$  of a chosen pole of a Poincare sphere", is made obvious by the disclosure at col. 8, lines 25-65. The Examiner acknowledges that this section of Pezzaniti fails to disclose "a plural number of states  $\chi_i$  with a chosen Poincare latitude and longitude within a distance  $\epsilon$  of a chosen pole of a Poincare sphere". However, the Examiner alleges that it would have been obvious to use the claimed states to measure different types of samples.

As stated in MPEP §2143, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second there must be a reasonable expectation of success. Finally, the prior art reference (or references when combines) must teach or suggest all the claim limitations. As further specified in the MPEP and further noted by the Federal Circuit, "one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention". *In re Fine*, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). The only motivation for "a plural number

of states  $\chi_i$  with a chosen Poincare latitude and longitude within a distance  $\epsilon$  of a chosen pole of a Poincare sphere” is found solely in the present application.

The paragraph preceding col. 8, lines 25-65 of Pezzaniti, which was referred to by the Examiner, states that measurements are made for two different states, wherein the second variable retarder is set to zero in a first state and then stepped to 180 degrees of retardance in the second state (col. 8, lines 12-19). These states disclosed by Pezzaniti fail to teach anything about or provide motivation for “a plural number of states  $\chi_i$  with a chosen Poincare latitude and longitude within a distance  $\epsilon$  of a chosen pole of a Poincare sphere”, as recited in independent claim 1. Furthermore, the disclosure in col. 8, lines 20-65 is for measuring circular dichroism (see col. 8, lines 4-5). Thus there is no motivation to modify the disclosed states of Pezzaniti for “varying a selected elliptical polarization state of the second polarizer to correspond to a plural number of states  $\chi_i$  with a chosen Poincare latitude and longitude within a distance  $\epsilon$  of a chosen pole of a Poincare sphere”, which is used for measuring (linear) retardance, as recited in independent claim 1.

In view of the above amendments and remarks, independent claim 1 is allowable over Pezzaniti.

#### Independent claim 18

Independent claim 18 recites “directing the other of the illumination beam and the collected light beam through a variable polarizer that expresses a plural number of elliptical polarization states  $\chi_i$ ”, “measuring an intensity of light incident on the photodetector during each of the plural states  $\chi_i$ ” and “calculating the retardance of the sample using the photodetector light intensity measurements”.

As stated above, Pezzaniti discloses that the Mueller matrix is determined by measurements in two states, i.e., in which the second variable retarder is set to zero in one state and then stepped to 180 degrees of retardance in the second state (col. 8, lines 12-19). This fails to teach “directing the other of the illumination beam and the collected light beam through a variable polarizer that expresses a plural number of elliptical polarization states  $\chi_i$ ”, as recited in independent claim 18. Furthermore, since that section of Pezzaniti referred to by the Examiner relates to measuring circular dichroism and is not at all related to measuring linear retardance, Pezzaniti fails to provide any motivation for “directing the other of the illumination beam and the collected light beam through a variable polarizer that expresses a plural number of elliptical polarization states  $\chi_i$ ”, as recited in independent claim 18.

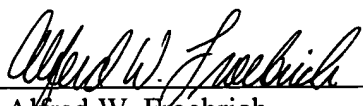
As described above, the term “retardance” is used throughout the present specification to refer to linear retardance as evidenced by the measurement of the azimuth angle in each example embodiment. In contrast, Pezzaniti teaches only use of Mueller matrix for measuring optical rotation (circular retardance) and circular dichroism (circular diattenuation) (col. 7, lines 21-24). Accordingly, Pezzaniti fails to disclose, teach, or suggest “calculating the retardance of the sample using the photodetector light intensity measurements”, as expressly recited in independent claim 18.

In view of the above remarks, independent claim 18 is also not obvious in view of Pezzaniti.

Dependent claims 2-14 and 19-23, each being dependent on one of independent claims 1 and 18, are allowable for at least the same reasons as are independent claims 1 and 18.

The application is now deemed to be in condition for allowance and notice to that effect is solicited.

Respectfully submitted,  
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